



AK5736 User's Guide

Temperature Characteristic of Power Supply Current

1. Outline

The AK5736 is 6ch ADC (Analog to Digital Converter) equipped with the diagnostic function which can monitor connection state of a microphone and input harness. This product can be operated with very low latency and is perfect for ANC (Active Noise Canceller) that needs high speed operation.

In this application note, the measurement results of temperature characteristics and power supply dependence of power consumption are shown for a power supply design considering any condition of temperature and voltage.

2. Measurement Result

In this chapter, the power supply dependency and the thermal characteristics of the AK5736 are shown as the measurement result under the following conditions. This result was measured with 1 sample.

Table 1. Condition and Result of Current Consumption

No.	Monitor Pin	Condition		Measurement Item and Result		
		LDOE pin	CPEN pin	Thermal Characteristic	Power Supply Dependency	I _{out} Dependency
1	All power supply pins	H	H	No	Yes	-
2	All power supply pins	L	H	No	Yes	-
3	All power supply pins	H	L	No	Yes	-
4	All power supply pins	L	L	No	Yes	-
5	CPVDD	L	L	No	Yes	Yes

Note 1. LDOE pin = "L": LOD is disable, LODE pin = "H": LDO is enable

Note 2. CPEN pin = "L": Internal Generation Mode, CPEN pin = "H": Outside Supply Mode

Note 3. I_{out}: Current from the CPOUT pin

Current consumption depends on power supply voltage, but it is not related to temperature.

In "Internal Generation Mode", the current consumption of CPVDD accounts the most of the current consumption of the AK5736. It does not depend on temperature but it is related to "I_{out}" current flowing from the CPOUT pin regardless of the CPEN pin status. The "I_{out}" current is estimated as "17mA + the current flowing from MIC bias generator (MPWR)"

In the datasheet, the consumption of CPVDD is the value when the current flowing from MIC bias generator is 80mA (I_{out} = 97mA).

■ Measurement Results

[Input Signal]

fs = 48kHz, Differential mode, IN*P pin = 6V, IN*N pin = 3V, Input Signal: -1dBFS, 1kHz sin wave
DC connection mode

(1) LDO: Enable (LDOE pin = "H") Outside Supply Mode (CPEN pin = "H")

Table 2. Consumption Current of Power Dissipation when LDOE pin = "H", CPEN pin = "H"

Condition						
Temp.	-40°C		25°C	105°C		Unit
Power Supply	Min.	Max.	Typ.	Min.	Max.	
AVDD (CPVDD=AVDD)	3.0	3.6	3.3	3.0	3.6	V
DVDD	3.0	3.6	3.3	3.0	3.6	
HVDD	12.0	16.0	14.5	12.0	16.0	
Power Supply Current						
AVDD+CPVDD	9.2	9.3	9.3	9.3	9.4	mA
DVDD	13.3	13.5	14.2	14.0	14.2	
HVDD (Note 4)	16.7	17.1	16.9	16.7	17.0	
HVDD (Note 5)	108.5	108.8	108.4	108.5	108.7	

Note 4. These are values when the MPWR pin is opened.

Note 5. These are values when the current flowing from the MPWR pin is 90mA.

(2) LDO: Disable (LDOE pin = "L") Outside Supply Mode (CPEN pin = "H")

Table 3. Consumption Current of Power Dissipation when LDOE pin = "L", CPEN pin = "H"

Condition						
Temp.	-40°C		25°C	105°C		Unit
Power Supply	Min.	Max.	Typ.	Min.	Max.	
AVDD (CPVDD=AVDD)	2.8	3.8	3.3	2.8	3.8	V
DVDD, VDD18	1.5	2.2	1.8	1.5	2.2	
HVDD	9.05	18.0	14.5	9.05	16.2	
Power Supply Current						
AVDD+CPVDD	9.1	9.3	9.4	9.3	9.4	mA
VDD18	11.0	13.1	12.0	11.4	13.8	
DVDD	0.5	0.6	0.6	0.5	0.6	
HVDD (Note 6)	108.5	108.5	108.6	108.6	108.7	

Note 6. These are values when the current flowing from the MPWR pin is 90mA.

(3) LDO: Enable (LDOE pin = "H") Internal Generation Mode (CPEN pin = "L")

Table 4. Consumption Current of Power Dissipation when LDOE pin = "H", CPEN pin = "L"

Condition						
Temp.	-40°C		25°C	105°C		Unit
Power Supply	Min.	Max.	Typ.	Min.	Max	
AVDD	3.0	3.6	3.3	3.0	3.6	V
DVDD	3.0	3.6	3.3	3.0	3.6	
CPVDD (HVDD=CPOUT)	3.0	3.6	3.3	3.0	3.6	
Power Supply Current						
AVDD	9.2	9.3	9.3	9.2	9.3	mA
DVDD	13.4	13.6	14.4	14.1	14.3	
CPVDD (HVDD=CPOUT)	492.5	498.2	496.7	493.6	495.7	

Note 7. These are values when the current flowing from the MPWR pin is 80mA.

(4) LDO: Disable (LDOE pin = "L") Internal Generation Mode (CPEN pin = "L")

Table 5. Consumption Current of Power Dissipation when LDOE pin = "L", CPEN pin = "L"

Condition						
Temp.	-40°C		25°C	105°C		Unit
Power Supply	Min.	Max.	Typ.	Min.	Max	
AVDD	3.0	3.6	3.3	3.0	3.6	V
VDD18	1.7	1.98	1.8	1.7	1.98	
CPVDD (HVDD=CPOUT)	3.0	3.6	3.3	3.0	3.6	
Power Supply Current						
AVDD	9.2	9.3	9.3	9.2	9.3	mA
VDD18	11.0	13.1	11.9	11.4	13.7	
DVDD	0.5	0.6	0.6	0.5	0.6	
CPVDD (HVDD=CPOUT)	494.0	493.0	495.8	495.2	496.5	

Note 8. These are values when the current flowing from the MPWR pin is 80mA.

(5) The current consumption of CPVDD in Internal Generation Mode(CPEN pin = "L"). The current consumption of CPVDD depends on power supply voltage, but it is not related to temperature. It depends on the "Iout" current that flows from the CPOUT pin (Table 6).

Table 6. Temperature Characteristics of Consumption Current at the CPVDD pin when CPEN pin = "L"

Condition						
Temp.	-40°C		25°C	105°C		Unit
Power Supply	Min.	Max.	Typ.	Min.	Max	
AVDD	3.0	3.6	3.3	3.0	3.6	V
VDD18	1.7	1.98	1.8	1.7	1.98	
CPVDD (HVDD=CPOUT)	3.0	3.6	3.3	3.0	3.6	
CPVDD Power Supply Current (Iout: Current flowing from CPOUT pin)						
Iout = 0mA	2.0	1.5	1.7	2.0	1.7	mA
Iout = 60mA	303.0	303.7	305.3	303.7	303.5	
Iout = 120mA	602.0	607.4	606.3	602.9	607.6	

Note 9. These are values when the LDOE pin = "L". The result will be equivalent if the LDOE pin = "H".

3. Revision History

Date (Y/M/D)	Revision	Reason	Page	Contents
2018/06/14	01	First revesion		

IMPORTANT NOTICE

0. Asahi Kasei Microdevices Corporation ("AKM") reserves the right to make changes to the information contained in this document without notice. When you consider any use or application of AKM product stipulated in this document ("Product"), please make inquiries the sales office of AKM or authorized distributors as to current status of the Products.
1. All information included in this document are provided only to illustrate the operation and application examples of AKM Products. AKM neither makes warranties or representations with respect to the accuracy or completeness of the information contained in this document nor grants any license to any intellectual property rights or any other rights of AKM or any third party with respect to the information in this document. You are fully responsible for use of such information contained in this document in your product design or applications. AKM ASSUMES NO LIABILITY FOR ANY LOSSES INCURRED BY YOU OR THIRD PARTIES ARISING FROM THE USE OF SUCH INFORMATION IN YOUR PRODUCT DESIGN OR APPLICATIONS.
2. The Product is neither intended nor warranted for use in equipment or systems that require extraordinarily high levels of quality and/or reliability and/or a malfunction or failure of which may cause loss of human life, bodily injury, serious property damage or serious public impact, including but not limited to, equipment used in nuclear facilities, equipment used in the aerospace industry, medical equipment, equipment used for automobiles, trains, ships and other transportation, traffic signaling equipment, equipment used to control combustions or explosions, safety devices, elevators and escalators, devices related to electric power, and equipment used in finance-related fields. Do not use Product for the above use unless specifically agreed by AKM in writing.
3. Though AKM works continually to improve the Product's quality and reliability, you are responsible for complying with safety standards and for providing adequate designs and safeguards for your hardware, software and systems which minimize risk and avoid situations in which a malfunction or failure of the Product could cause loss of human life, bodily injury or damage to property, including data loss or corruption.
4. Do not use or otherwise make available the Product or related technology or any information contained in this document for any military purposes, including without limitation, for the design, development, use, stockpiling or manufacturing of nuclear, chemical, or biological weapons or missile technology products (mass destruction weapons). When exporting the Products or related technology or any information contained in this document, you should comply with the applicable export control laws and regulations and follow the procedures required by such laws and regulations. The Products and related technology may not be used for or incorporated into any products or systems whose manufacture, use, or sale is prohibited under any applicable domestic or foreign laws or regulations.
5. Please contact AKM sales representative for details as to environmental matters such as the RoHS compatibility of the Product. Please use the Product in compliance with all applicable laws and regulations that regulate the inclusion or use of controlled substances, including without limitation, the EU RoHS Directive. AKM assumes no liability for damages or losses occurring as a result of noncompliance with applicable laws and regulations.
6. Resale of the Product with provisions different from the statement and/or technical features set forth in this document shall immediately void any warranty granted by AKM for the Product and shall not create or extend in any manner whatsoever, any liability of AKM.
7. This document may not be reproduced or duplicated, in any form, in whole or in part, without prior written consent of AKM.